

Relict landslide detection at the cultural heritage site of Abakainon necropolis (NE Sicily)

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Keywords: Relict landslide, Abakainon necropolis, Cultural Heritage.

The Greek colony of Abakainon was founded in northeastern Sicily by Sicels, in a strategic location from the military and trading points of view. Recent archaeological excavation campaigns allowed discovering a buried city, with precious and well-preserved finds, and a wide necropolis area with about 150 well-preserved tombs, dated between the end of the fourth century BC and the beginning of the second century BC. Several tombs are partially collapsed or broken, probably due to a natural event. From a morphological point of view, the necropolis lies on the flank of a NNE-SSW trending steep slope, on a portion characterized by a slightly flatter morphology, which reminds an old landslide body. Starting from this element, new geomorphological and geophysical investigations were carried out with the purpose of looking for evidence of landslides and tectonic structures close to the necropolis area and of finding out if the necropolis was really built on a landslide body. Geomorphological surveys highlighted crucial aspects on the interaction between tectonics (mainly fault segments) and main geomorphological features (e.g., river path, crest lines, landslides), as several deviations of crest lines and river path, as well as plano-altimetric ruptures, which were surveyed at the intersection with tectonic structures. Geophysical surveys, mainly aimed at passive ambient noise measurements, allowed recognizing three main characteristic impedance contrasts, which were correlated with peculiar elements of the study area such as (1) a deep geological contact between the crystalline basement and the overlapping sedimentary cover, (2) the old landslide sliding surface, (3) buried tombs (Pappalardo et al., 2018). Moreover, strong directional effects at some recorded H/V spectra highlight the occurrence of fault segments bordering and even affecting the landslide body. This is a key evidence, proving that the necropolis was built on a relict landslide, which occurred before the latest reactivation of the surveyed faults. In this perspective, it is likely that Abakainon necropolis collapsed because of the shaking of an old earthquake, whose action was probably enhanced by a site effect caused by the presence of the relict landslide body on which the necropolis itself was built. This can explain the current setting of tombs and ruins at the necropolis site. Achieved results confirm that the presented multidisciplinary approach is a suitable tool to clarify the geology of an area, especially where faults and landslides are not easy to survey due to local restriction of a heritage site.

Pappalardo, G., Imposa, S., Barbano, M.S., Grassi, S., Mineo, S. (2018): Study of landslides at the archaeological site of Abakainon necropolis (NE Sicily) by geomorphological and geophysical investigations. *Landslides* DOI 10.1007/s10346-018-0951-y.